Distributed Data Management Support for Collaborative Computing

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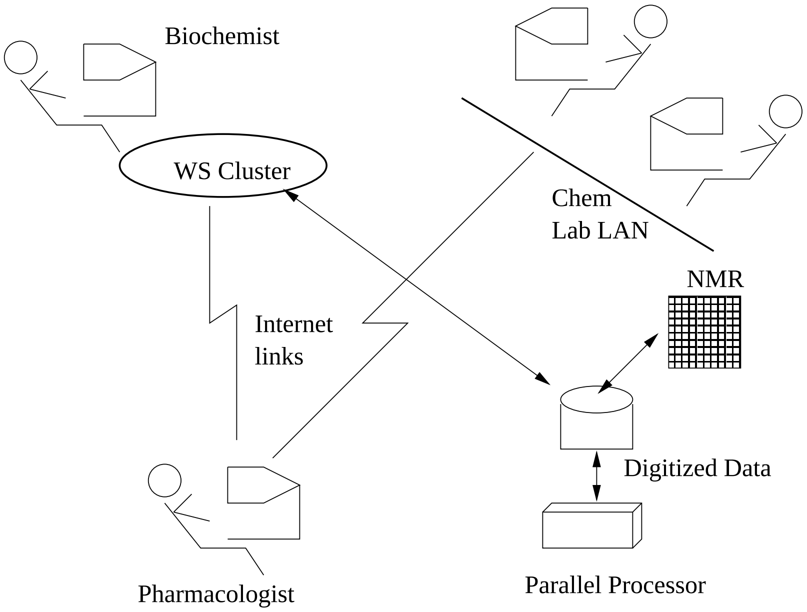
Overview



- Displays
- AV conferencing
- Compute space
- Data management support
- Communication system

Application Scenario

Use shared data for computation

⇓

View output

⇓

Report results in electronic notebook

⇓

Collaborative edit journal paper

Collaborative Computing Data Space

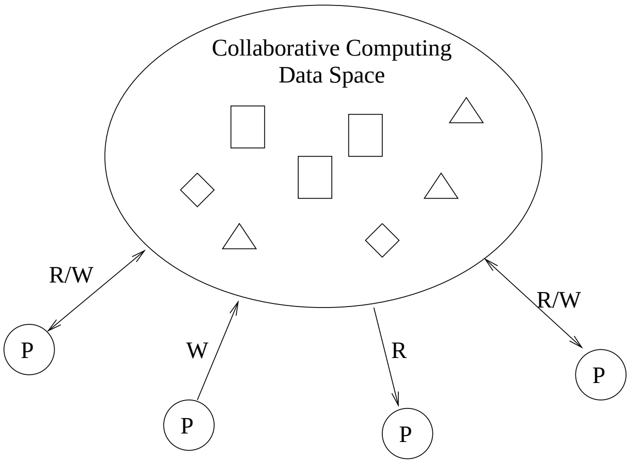
Objectives

- Shared data space for collaborative environments
- Interface to shared objects
- Concurrent access
- User-level tools
- Application Programming Interface

CCDS - Requirements

- Consistent
- Distributed
- Heterogeneous
- Fault tolerance
- Performance, scalability
- Security

CCDS - Model



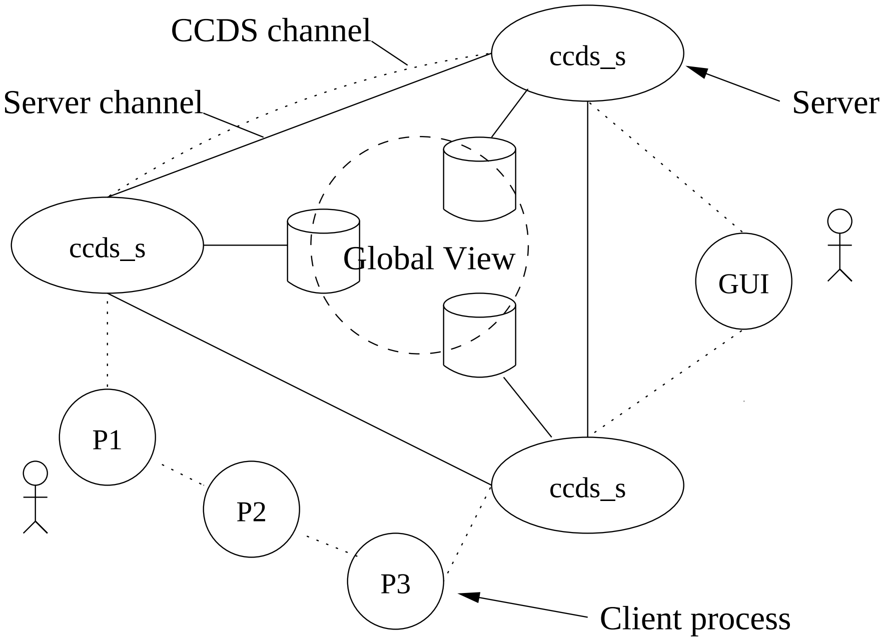
Shared Virtual Objects

- Native file
- Replicated file
- Directory
- Active, Device
- Pipe, FIFO

Virtual Object Operations

- Import / un-import
- Create new object
- Object attributes (name, type, owner, permissions, token, coherence, data)
  - Coherence (real-time, on-demand, interval, never)
- Application programming interface
- Standard file operations
- Object specific operations

CCDS - System Architecture



CCDS - Design

- No root access required
- One server per machine per session
- Native file system
- Group and point-to-point communication
- Flat global name space
- Distributed name service

CCDS - API

- `int ccds_init( argc, argv )`
- `void ccds_leave( )`
- `int ccds_open( name, ...  )`
- `void ccds_close( fdes )`
- `void ccds_delete( name )`
- `int ccds_read( fdes, buf, nbyte )`
- `int ccds_write( fdes, buf, nbyte )`
- `long ccds_lseek( fdes, offset )`
- `int ccds_lock( fdes, size )`
- `int ccds_olock( fdes, offset, size )`
- `int ccds_unlock( fdes )`
- `int ccds_import( srcname, dstname )`
- `int ccds_unimport( srcname, dstname )`
- `int ccds_property( name, buf )`
- `int ccds_ls( buf, nitem )`
- `void ccds_notify( cb )`

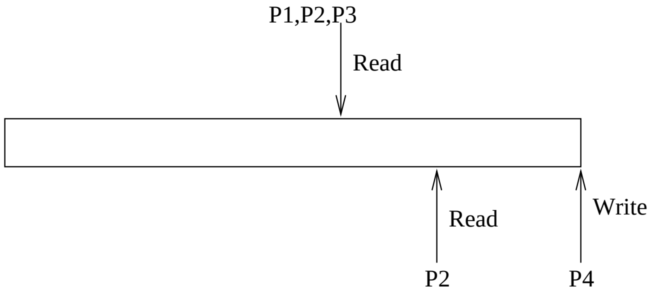
CCDS - Pointers

`int ccds_open(name, oflag, mode, view, lflag)`

File handle can not be shared

`view` is Shared or Local

- Shared: Processes share read or write file pointer.
- Local: Only process can access file pointer.



Summary and Future

- Proposed framework for CCDS
- Architecture
- Implementation
- Integration with collaborative computing systems